REMARKS

Applicant respectfully submits that the remarks included herein place the application into condition for allowance and reconsideration is respectfully requested. No new matter is added.

Rejection of claims 1 and 4-11 under 35 U.S.C. § 112, First Paragraph - Enablement

The Examiner has rejected claims 1 and 4-11 under 35 U.S.C. § 112, first paragraph, as allegedly encompassing subject matter that has not been sufficiently described to enable one of ordinary skill in the art to make and use the claimed invention.

The Examiner opines that the specification teaches that the relationship between band gap width and impurity concentration is inversely proportional and that an increase in impurity implies a decrease in band gap width. The Examiner, therefore, concludes that the skilled artisan would not be able to make and use the claimed semiconductor device wherein a band gap in the upper layer of the second semiconductor layer decreases while the impurity concentration in the upper layer is substantially constant. Applicant respectfully disagrees.

The support for claim 1's recitation of, "a band gap in the upper layer of the second semiconductor layer decreases gradually in a direction from the emitter region toward the collector region, and the impurity concentration in the upper layer is substantially constant ..." can be found throughout the specification but specifically on page 13, lines 19-20.

Applicant respectfully submits that the Examiner has misapplied the relationship discussed in the specification, between band gap width, the Ge content, and the impurity concentration in a SiGe graded composite layer 18a, as illustrated in Figs. 6 and 7. The Examiner seems to have confused the impurity (dopant) concentration and the Ge content with respect to their relationships with band gap width. A band gap width of a semiconductor is not affected by the impurity (dopant) concentration. The specification teaches that while the Ge content of a SiGe upper layer 18b gradually increases, the band gap width gradually decreases, yet the impurity concentration 32 stays substantially constant (Fig. 3).

For example, when impurities (dopant) such as phosphorus (P), arsenic (As) or boron (B) are added to Si, the Si band gap width (i.e., space between an end of conduction band and an

end of valence band) does not change. Likewise, when $Si_{80}Ge_{20}$ is doped with impurities, the band gap width remains constant.

Alternatively, band gap width changes due modifications semiconductor composition with respect to Ge content. For example, Si, $Si_{80}Ge_{20}$, and $Si_{70}Ge_{30}$ have differing band gap widths. When the Ge content gradually changes, the band gap width also gradually changes in irrespective of the impurity concentration.

Given the explanation above, Applicant respectfully asserts that the skilled artisan would be able to make and use the claimed semiconductor device wherein a band gap in the upper layer of the second semiconductor layer decreases while the impurity concentration in the upper layer is substantially constant. Accordingly, Applicant respectfully requests withdrawal of this rejection.

CONCLUSION

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees and net addition of claims, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

McDERMOTT, WILL & EMERY

Date: Nov. 13, 2003

Thomas A. Haag, Ph.D., Esq.
Registration No. 47,621

600 13th Street, N.W.
Washington, DC 20005-3096
Telephone: (202) 756-8000
Facsimile: (202) 756-8087